What is claimed is:

1. A communication method, comprising:

receiving a first plurality of spatially-multiplexed signals through a second plurality of receive antennas, thereby forming a second plurality of received signals;

dividing said second plurality of received signals into a third plurality of divided signals;

weighting said third plurality of divided signals so as to form a third plurality of weighted signals;

combining ones of said third plurality of weighted signals in order to form a fourth plurality of combined signals; and

downconverting said fourth plurality of combined signals into a fourth plurality of down-converted signals.

2. The method of claim 1 further including:

filtering said fourth plurality of combined signals; and

converting said fourth plurality of down-converted signals into digital signals.

3. The method of claim 1 wherein said first plurality of spatially-multiplexed signals are RF signals and wherein said weighting and combining are performed within the RF domain.

4. The method of claim 1 wherein each of said second plurality of received signals is divided into a set of signal components equal in number to said fourth plurality of combined signals.

5. The method of claim 1 wherein said second plurality of receive antennas are greater in number than said fourth plurality of combined signals.

6. The method of claim 1 wherein said first plurality of spatially-multiplexed signals are equal in number to said fourth plurality of combined signals.

7. A communication method, comprising:

demultiplexing an input signal into a first plurality of demultiplexed signals;

upconverting said first plurality of demultiplexed signals into a first plurality of upconverted signals;

dividing said first plurality of upconverted signals into a second plurality of divided signals;

weighting said second plurality of divided signals so as to form a second plurality of weighted signals;

combining ones of said second plurality of weighted signals in order to form a third plurality of combined signals; and

transmitting said third plurality of combined signals.

8. The method of claim 7 wherein said third plurality of combined signals are transmitted via a corresponding third plurality of antennas.

9. The method of claim 7 further including converting said first plurality of demultiplexed signals into analog signals.

10. The method of claim 7 further including weighting and combining, in the baseband domain, said first plurality of demultiplexed signals prior to said upconverting.

11. The method of claim 7 wherein said second plurality of divided signals are RF signals and wherein said weighting and combining are performed within the RF domain.

12. The method of claim 8 wherein said first plurality of demultiplexed signals are less in number than said third plurality of antennas.

13. The method of claim 7 wherein each of said first plurality of upconverted signals is divided into a set of signal components equal in number to said third plurality of combined signals.

14. A communication apparatus, comprising:

an antenna structure for receiving a first plurality of spatially-multiplexed signals so as to form a second plurality of received signals;

a set of dividers for dividing said second plurality of received signals into a third plurality of divided signals;

an arrangement of weighting elements capable of weighting said third plurality of divided signals, thereby forming a third plurality of weighted signals;

an arrangement of combining elements capable of combining ones of said third plurality of weighted signals into a fourth plurality of combined signals; and

a downconverter configured to downconvert said fourth plurality of combined signals into a fourth plurality of down-converted signals.

15. The communication apparatus of claim 14 further including:

a filter arrangement capable of filtering said fourth plurality of combined signals; and

a set of A/D converters disposed to convert said fourth plurality of down-converted signals into digital signals.

16. The communication apparatus of claim 14 wherein said first plurality of spatially-multiplexed signals are RF signals and wherein said weighting and combining are performed within the RF domain.

17. The communication apparatus of claim 14 wherein said set of dividers are capable of dividing each of said second plurality of received signals into a set of signal components equal in number to said fourth plurality of combined signals.

18. The communication apparatus of claim 14 wherein said antenna structure includes a second plurality of antennas disposed to receive said first plurality of spatially-multiplexed signals, said second plurality of antennas being greater in number than said fourth plurality of combined signals.

19. A communication apparatus, comprising:

a demultiplexer disposed to demultiplex an input signal into a first plurality of demultiplexed signals;

an upconverter operative to upconvert said first plurality of demultiplexed signals into a first plurality of upconverted signals;

an arrangement of dividing elements capable of dividing said first plurality of upconverted signals into a second plurality of divided signals;

an arrangement of weighting elements capable of weighting said second plurality of divided signals so as to form a second plurality of weighted signals; and

a combiner arrangement for combining ones of said second plurality of weighted signals in order to form a third plurality of combined signals capable of being transmitted through an antenna structure.

20. The communication apparatus of claim 19 wherein said third plurality of combined signals are transmitted via a corresponding third plurality of antennas of said antenna structure.

21. The communication apparatus of claim 19 further including a D/A converter for converting said first plurality of demultiplexed signals into analog signals.

22. The communication apparatus of claim 19 further including an arrangement capable of weighting and combining, in the baseband domain, said first plurality of demultiplexed signals prior to provision to the upconverter.

23. The communication apparatus of claim 19 wherein said second plurality of divided signals are RF signals and wherein said weighting and combining are performed within the RF domain.

24. The communication apparatus of claim 20 wherein said first plurality of demultiplexed signals are less in number than said third plurality of antennas

25. The method of claim 1 further including:

converting said fourth plurality of down-converted signals into digital signals;

processing said digital signals so as to yield processed baseband signals; and

multiplexing said processed baseband signals into a digital output stream.

26. The method of claim 25 wherein said processing consists of weighting and combining said digital signals.

27. The apparatus of claim 14 further comprising:

a set of analog to digital converters for converting said fourth plurality of down-converted signals into digital signals;

a digital signal processor disposed to process said digital signals so as to yield processed baseband signals; and

a multiplexer configured to multiplex said processed baseband signals into a digital output stream.

28. The apparatus of claim 27 wherein said to process said digital signals consists of weighting and combining said digital signals.

29. A communication apparatus operatively coupled to an antenna structure capable of receiving a first plurality of RF signals, the apparatus comprising:

an RF processing network, coupled to said antenna structure, operative to perform weighting and combining operations within the RF domain upon said first plurality of RF signals, thereby producing a second plurality of RF signals; and

a downconverter configured to downconvert said second plurality of RF signals into a second plurality of down-converted signals.

30. The apparatus of claim 29 wherein said RF processing network includes a set of dividers for dividing said first plurality of RF signals into a third plurality of divided RF signals wherein said first plurality, said second plurality and said third plurality are different in number.

31. The apparatus of claim 30 wherein said RF processing network further includes:

an arrangement of weighting elements capable of weighting said third plurality of divided RF signals, thereby forming a third plurality of weighted RF signals;

an arrangement of combining elements capable of combining ones of said third plurality of weighted RF signals into said second plurality of RF signals.

32. The apparatus of claim 29 further comprising:

a set of analog to digital converters for converting said second plurality of down-converted signals into digital signals;

a digital signal processor disposed to weight and combine said digital signals so as to yield a digital output stream.

33. A communication apparatus, comprising:

a demultiplexer disposed to demultiplex an input signal into a first plurality of demultiplexed signals;

an upconverter operative to upconvert said first plurality of demultiplexed signals into a first plurality of RF signals; and

an RF processing network operative to perform weighting and combining operations in the RF domain upon said first plurality of RF signals, thereby producing a second plurality of RF signals capable of being transmitted by an antenna structure.

34. The apparatus of claim 33 wherein said RF processing network includes an arrangement of dividing elements capable of dividing said first plurality of RF signals into a third plurality of divided RF signals.

35. The apparatus of claim 34 wherein said RF processing network further includes:

an arrangement of weighting elements capable of weighting said third plurality of divided RF signals so as to form a third plurality of weighted RF signals;

a combiner arrangement for combining ones of said third plurality of weighted RF signals in order to form said second plurality of RF signals.

36. The apparatus of claim 33 further including an arrangement capable of weighting and combining, in the baseband domain, said first plurality of demultiplexed signals prior to provision to the upconverter.

37. A communication apparatus, comprising:

an upconverter operative to upconvert an input signal into an input RF signal; and

an RF processing network operative to perform a weighting operation in the RF domain upon said input RF signal and thereby produce a first plurality of RF signals capable of being transmitted by an antenna structure.

38. The apparatus of claim 37 wherein said RF processing network includes an arrangement of dividing elements capable of dividing said input RF signal into a first plurality of divided RF signals.

39. The apparatus of claim 37 wherein said RF processing network further includes an arrangement of weighting elements capable of weighting said first plurality of divided RF signals so as to form said first plurality of RF signals.

40. The apparatus of claim 31 wherein values of said weighting elements are selected to maximize an output signal-to-noise ratio of said apparatus.

41. The apparatus of claim 35 wherein values of said weighting elements are selected to maximize an output signal-to-noise ratio of a receiver disposed to receive said second plurality of RF signals.

42. The apparatus of claim 39 wherein values of said weighting elements are selected to maximize an output signal-to-noise ratio of a receiver disposed to receive said first plurality of RF signals.

43. The apparatus of claim 14 wherein values of said weighting elements are selected to maximize an output signal-to-noise ratio of said apparatus.

44. The apparatus of claim 19 wherein values of said weighting elements are selected to maximize an output signal-to-noise ratio of a receiver disposed to receive said third plurality of combined signals.